Every Student Counts

Professional Development Guide
Middle School Level

Year 2 - Day 1

Iowa Department of Education

Middle School Session –Facilitator's Plan
Year 2 - Day 1

Content Goals:

NCTM Geometry Standards

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments Represent and analyze mathematical situations and structures using algebraic symbols
- Use visualization, spatial reasoning, and geometric modeling to solve problems about geometric relationships

NCTM Measurement Standard

- Understand measurable attributes of objects and the units, systems, and processes of measurement

Principle Focus: Equity

Process Focus: Communication
Reasoning and Proof
Problem Solving

Overall Teaching Goal: Teaching and learning mathematics through problem solving

Activity	Description for Facilitator	Time (Min)	Teacher Masters (TM) & Materials
1. Welcome and opening	▪ Welcome ▪ Review Year 2 Outline ▪ Review Daily Overview ▪ Review Day 1 agenda ▪ Discuss equity principle	45	**TM 1:** Year Two Outline **TM 2:** Daily Overview **TM 3:** Year 2 Day 1 Agenda **TM 4:** Equity Guiding Questions • Principles and Standards for School Mathematics (PSSM) • PSSM Quick Reference Guide
2. bunch of activities	▪ describe as you go		
3. Closure	▪ Summarize the day		

Facilitator's Tool for Planning the Session

Equipment and materials **facilitator** should bring:
Equipment and materials **participants** should bring:
Additional Considerations:

Activity 1: Welcome and Opening

Time: 45 minutes

Overview and Rationale:
Conducting the Activity:
Materials

TM-1

Year 2 Outline
2005-2006

	Day 1 October 4/5	Day 2 November 8/9	Day 3 January 31/February 1	Day 4 April 11/12
NCTM Content Standard	Geometry	Geometry	Geometry	Geometry
	Analyze characteristics and properties of 2 and 3-dimensional shapes and develop mathematical arguments about geometric relationships	Use visualization, spatial reasoning, and geometric modeling to solve problems	Specify locations and describe spatial relationships using coordinate geometry and other representational systems	Apply transformations and use symmetry to analyze mathematical situations
NCTM Content Standard 2	Geometry	Measurement	Measurement	
	Use visualization, spatial reasoning, and geometric modeling to solve problems	Apply appropriate techniques, tools, and formulas to determine measurements	Apply appropriate techniques, tools, and formulas to determine measurements	
NCTM Content Standard 3	Measurement			
	Understand measurable attributes of objects and the units, systems, and processes of measurement			
Mathematical Activities	Analyzing characteristics and properties of polygons	Use visualization, spatial reasoning, and geometric modeling Maximizing and minimizing area, perimeter and volume	Use coordinate geometry to represent and examine the properties of geometric shape	Apply transformations and use symmetry to analyze mathematical situation
NCTM Principle	Equity	Technology	Teaching	Learning

	Day 1 **October 4/5**	**Day 2** **November 8/9**	**Day 3** **January 31/February 1**	**Day 4** **April 11/12**
NCTM Process Standard	Communication Reasoning and Proof Problem Solving	Communication Representation Problem Solving	Connections Problem Solving	Problem Solving Connections
Assessment	Teacher Observation Checklist to provide Feedback to the Students Questioning	Rubric Collecting Samples of Participants' Work Analyzing Student Work to Provide Feedback to the Students	Formative use of summative assessment Examining ITBS and classroom summative assessment	Peer Assessment
Technology/ Manipulative Tools	Sketchpad Navigation CD Computer (participants bring) Geostrips	Graphing Calculator Navigation CD – Applet Cubes Web Page: www.	Graphing Calculator Geoboard	Applet Sketchpad Geoboard Georeflector Computer (participants bring)

Every Student Counts means . . .

TM-2

Teach for Understanding and Focus on Meaning

Problem-Based Instructional Tasks Teaching through Problem Solving	Meaningful Distributed Practice of Concepts, Skills, & Problem Solving

Today's Goals . . .

Content Goal: Geometry
Measurement

Principle Goal: Equity

Process Goal: Communication, Reasoning and Proof, Problem Solving

Today's Activities . . .

- *Analyze characteristics and properties of two-dimensional geometric shapes and develop mathematical arguments*
- *Represent and analyze mathematical situations and structures using algebraic symbols*
- *Use visualization, spatial reasoning, and geometric modeling to solve problems about geometric relationships*

TM 3

Year 2 Day 1 Agenda

Content Goals:

NCTM Geometry Standards

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments Represent and analyze mathematical situations and structures using algebraic symbols
- Use visualization, spatial reasoning, and geometric modeling to solve problems) about geometric relationships

NCTM Measurement Standard

- Understand measurable attributes of objects and the units, systems, and processes of measurement

Principle Focus: Equity

Process Focus: Communication
Reasoning and Proof
Problem Solving

Agenda:

- Welcome and opening
- Meaningful Distributed Practice
- Problem-Based Instructional Task (Strings)
- Van Hiele discussion
- Activities with Geosketch pad
- Meaningful Distributed Practice/Think Aloud
- Debrief Geometry Readings
- Closure

Assignments for November 8/9:

- Introduction in *Navigating Through Geometry in Grades 6 - 8* on visualization, spatial reasoning and modeling: Read pp. 59 - 60
- *NCTM Principles and Standards* – Technology: Read pp. 24 – 27
- *NCTM Principles and Standards* – Visualization: Read pp. 237 – 239
- *Navigating Through Geometry in Grades 6 - 8* (CD Rom): Read Carol E. Malloy – "Perimeter and Area through the van Hiele model"

TM-4 Equity Discussion Guide:

List three things you have seen (or wish you had seen) in classrooms that exemplify this principle?

What impact will this principle have on you as a trainer and/or in a classroom?

Activity 2: Meaningful Distributed Practice (MDP)

Time: 35 minutes

Overview and Rationale

This activity provides a review and discussion of Meaningful Distributed Practice. It introduces a new template that includes assessment in planning for Meaningful Distributed Practice.

Connections

This connects MDP with geometry goals and assessment.

Conducting the Activity

Introduction

- Put teacher hat on the table to show that
- Set a timer to show the activity can take place in 5 minutes and still address conceptual development
- Do MDS activity 2
- Address questions A through D in activity
- Use observation sheet to record information for one or two tables. “0” means student does not have concept. ”X” means student does have concept. This information will be used later in the day.
- Have a brief discussion of why these problems are examples of Meaningful Distributed Practice.
-
- Review MDP by using the component teaching master TM 5.
- Review the highlights of the detailed definition of MDP TM 6, the – italics have been added to emphasize the key components. Remind participants that MDP should not last longer than 5 minutes. If manipulatives are used, it should be the teacher who uses them on the overhead. The purpose is to develop concepts, skills and problem-solving. It is NOT meant as an opportunity to drill skills. That type of practice could take place at another time, but it is not MDP.
-

Materials

TM 5: MDP Components
TM 6: MDP Explanation
TM 7: MDP Activities
TM 8: Teacher Observation Sheet

- Clipboard
- Teacher hat or some indication to use to show teacher time
- Timer

TM 7

Meaningful Distributed Practice Activities

Big Idea(s) _Geometry: Precisely describe, classify, and understand relationships among types of two and three-dimensional objects using their defining properties

MDP Activity 1	MDP Activity 2	MDP Activity 3
Draw ▪ Quadrilateral ▪ Pentagon ▪ Triangle ▪ Hexagon	Draw ▪ Quadrilateral with 4 congruent sides (can you do more than one?) ▪ Quadrilateral with 4 congruent angles (can you do more than one?) ▪ Quadrilateral with 4 congruent sides and 4 congruent angles (can you do more than one?)	Draw ▪ Triangle with two congruent sides ▪ Triangle with no congruent sides ▪ Quadrilateral with opposite sides congruent ▪ Quadrilateral with opposite angles congruent
Questions: a. Compare your shape with others at your table. How are they alike and how are they different? b. How did you decide how many sides your shape would have? c. What other prefixes do you know that would help you describe shapes?	Questions: a. Compare your shape with others at your table. How are they alike and how are they different? b. After drawing these, how do we know for sure that sides are congruent? c. Teacher will share markings to indicate congruent sides, congruent angles, and right angles. d. Students mark their drawings.	Questions: a. Compare your shapes with others at your table. How are they alike and how are they different? b. How do you determine which sides and angles are opposite?
Assessment: Assessment of prior knowledge of shapes and prefixes.	Assessment: Assessment of prior knowledge of congruency, right angles and marking of drawings	Assessment: Assessment of prefixes, congruency, and opposite.

TM – 7 Continued

Meaningful Distributed Practice Activities

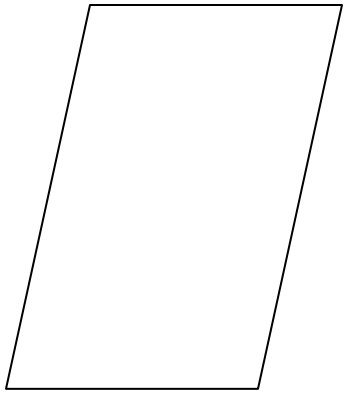
MDP Activity 4	MDP Activity 5	MDP Activity 6
Draw ▪ Quadrilateral with 2 sets of parallel sides ▪ Quadrilateral with only 1 set of parallel sides ▪ Quadrilateral with 2 sets of parallel sides and 4 congruent sides. (Can you make more than one shape?)	Describe the following shapes. (Shapes follow)	Describe the following shapes. (Shapes follow)
Questions: a. Compare your shape with others at your table. How are they alike and how are they different? b. After drawing these, how do we know for sure that sides are parallel and congruent? e. Teacher will share markings to indicate parallel sides, congruent sides, congruent angles, and right angles. c. Students mark their drawings.	Questions: How would you describe each shape? a. Are there other ways to describe it? b. How do you know if sides are parallel and/or congruent c. angles are congruent?	Questions: a. Describe the shapes. b. Teacher defines equilateral. Which shapes are equilateral? c. Teacher defines equiangular. Which shapes are equiangular? d. Which shapes are both equilateral and equiangular? Teacher then gives definition of regular polygon. Which of the shapes are regular polygons?
Assessment: Assessment of prior knowledge of parallel sides and marking of drawings	Assessment: Knowledge of prefixes and markings	Assessment: Knowledge of markings and characteristics of polygons.

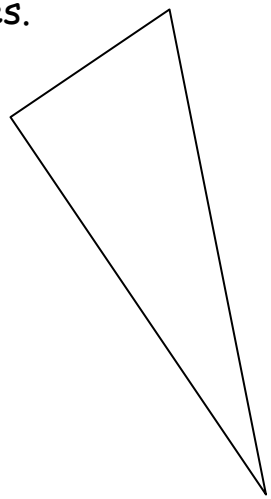
TM – 7 Continued

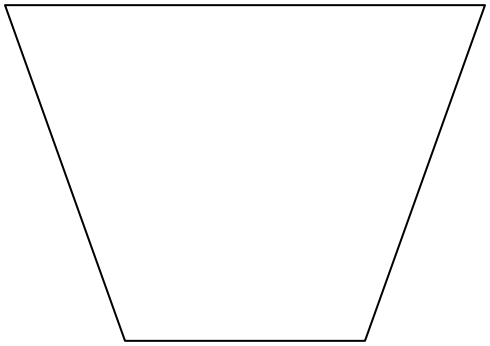
Meaningful Distributed Practice Activities

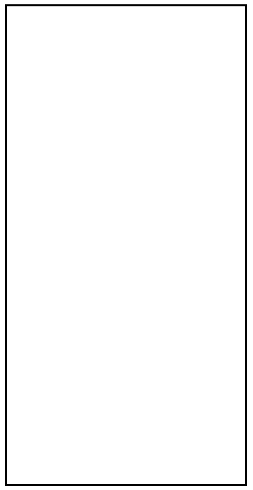
Day 5

Describe the following shapes.







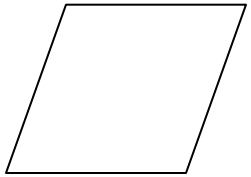


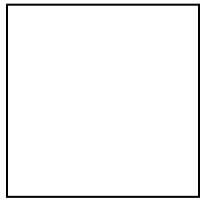
TM – 7 Continued

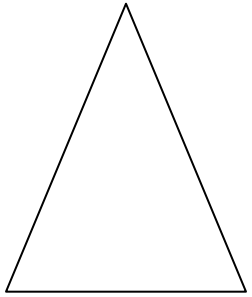
Meaningful Distributed Practice Activities

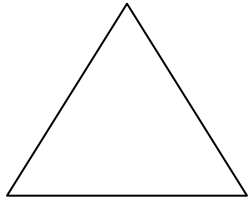
Day 6

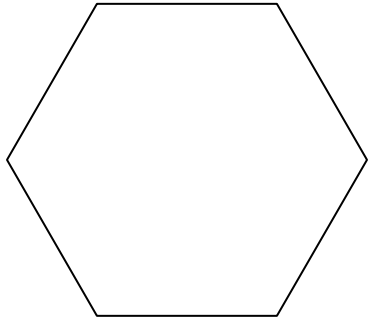
Describe the following shapes





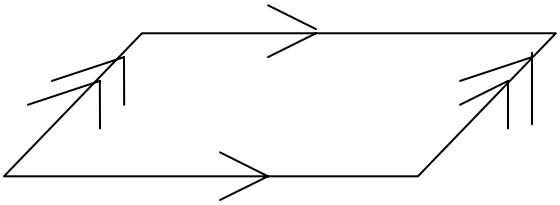




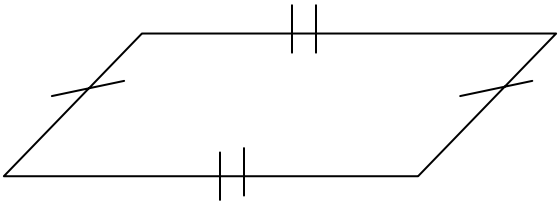


Labeling Conventions

Labeling Parallel Sides and Sides of Equal Length
Here are some marks that mathematicians use to show parallel sides and sides of equal length.

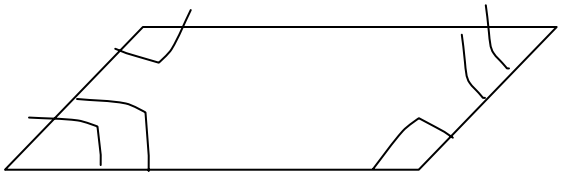


Arrows drawn on the sides indicate parallel sides. Corresponding pairs of parallel sides have matching arrow marks.

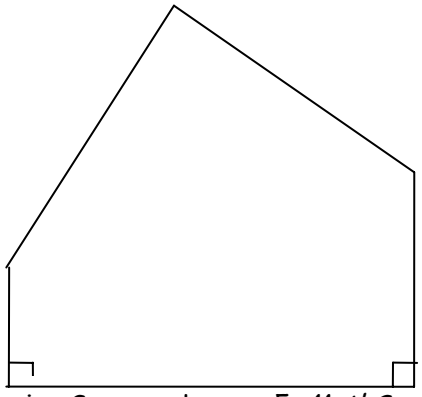


Hatch marks drawn on the sides indicate sides of equal length. Corresponding pairs of equal sides have matching hatch marks.

Labeling Equal Angles and Right Angles
Here's how mathematicians show



Arcs with a hatch mark drawn in the interior of an angle indicate equal angles. Congruent angles are indicated with an arc that has the same number of hatch marks.



A "box," or right angle drawn in the interior of an angle, indicates a right angle.

"Designing Spaces.– Lesson 5. *MathScape*.

TM-8

TEACHER OBSERVATION
Concept and Skills

	Meaningful Distributed Practice (Preview)Task (10/4/05) (10/5/05)	Meaningful Distributed Practice (Review and Extension) Task (10/4/05) (10/5/05)		
What are the key learnings we want student to know from this lesson?	Students demonstrate understanding of congruence by drawing a quadrilateral with 4 congruent sides.	Cards are below (Additional Sides and Angles)		
Person A				
Person B				
Person C				
Person D				
Person E				
Person F				

TM- 5

Meaningful Distributed Practice of Concepts, Skills, and Problem-Solving

- Help students develop a deep understanding of a BIG IDEA
- Use problems and activities that help students learn to use multiple representations, and learn to use multiple reasoning strategies
- Help students develop a deep understanding so that they can use the representations and reasoning flexibly and fluently
- Use problems from a variety of contexts so students learn when it makes sense to apply this BIG IDEA in everyday life.

TM-6

Explanation of Meaningful Distributed Practice of Concepts, Skills and Problem Solving

What is the Research Rationale?

Long-term retention is best served if assignments are spread out in time rather than concentrated within short intervals (Iowa Content Network, http://www.state.ia.us/educate/ecese/tqt/tc/prodev/mathematics.html).

What Does Meaningful Distributed Practice for Concepts and Problem Solving Look Like?

Distributed practice is *consistent* practice distributed over a *long period of time*. It can be presented in *brief* (about five minutes) problem solving and/or conceptual activities *three to five times a week* throughout the school year. These instructional activities should reinforce the *BIG IDEA* that you have chosen for your building improvement plan for Every Student Counts. The problems and activities that you use for distributed practice should be chosen to *help students develop a deep understanding of that BIG IDEA*.

These problems and activities should be *student-centered*, in the sense that the students derive their own ways to model, to reason with, and to explain the problems.
The problems and activities should:

- Include a *variety of connections to real-world situations*
- Encourage the use of a *variety of models or representations*
- Allow for a *variety of reasoning or solution strategies*.

Ask for *two, or possibly three, explanations* of the problem.
Summarize by briefly highlighting the *different representations and reasoning strategies* that were used.

What are the *Purposes* of Meaningful Distributed Practice?

To help students develop a deep understanding of a ***BIG IDEA***,

- Problems and activities should help students
  - learn to use *multiple representations*, and
  - learn to use *multiple reasoning strategies*
- With such deep understandings that they can use the representations and reasoning
  - *Flexibly*
  - *Fluently*.
- In addition, by using problems from a variety of contexts, the students should learn when it makes sense to *apply* this BIG IDEA in *everyday life*.

Activity 3: Problem-Based Instructional Task

Time: 85 minutes

Overview and Rationale

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Connections

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Conducting the Activity

- Have people form groups of 3 or 4 – Each group receives a ribbon/string.
- Participate in string activity – making shapes with string
- Debrief (model questioning and then debrief questioning) 15 minutes
- Do geosticks activity (15 minutes)
- Debrief (Differentiation discussion - model questioning and then debrief questioning) 15 minutes
- Share assessment results from observation
- Assessment: - Debrief Teacher Observation
- Will we be sorting 3D objects in this section? If so, where?

Directions:

- Differentiation discussion (using the sticks
- Think Aloud: Discussion of string/sticks in our planning?
- What were the benefits of using string?

a. What were the benefits of using sticks?
b. Extension: can you find a shape with more than 4 sides that meet these criteria

2. Quadrilateral with 2 pairs of parallel sides and only two sides equal

- R18 in MathScape : Designing Spaces.)
- Unless the clue states otherwise, your shape can have any number of sides.

Materials

TM 9:
TM 10:
TM 11:
TM 12:

- String/ribbon (4 yards per group)

TM-10

PROBLEM-BASED INSTRUCTIONAL TASK LESSON PLAN

OBJECTIVE/BENCHMARK:
Larry, I think I need some direction as to the order of the activities we'll do in this section. I think the handouts are NOT in the correct order – assuming they are the correct handouts.

- Understanding the meaning of the concepts parallel and equilateral and apply them to create different shapes.
- Perform visual and mental experiments with shape transformations.
- Learn the formal geometric notation for equal and parallel sides.
- Devise tests for comparing lengths of sides in a shape.

TITLE: String Shapes

GRADE LEVEL/COURSE: Middle School

PRE-REQUISITE KNOWLEDGE:

NCTM STANDARD(S): (Shaded)

NCTM Content Standards →	Number & Operations	Algebra	Geometry	Measurement	Data Analysis & Probability
NCTM Process Standards →	Problem Solving	Reasoning & Proof	Communication	Connections	Representation

MATERIALS NEEDED:

Audio-visual:
Manipulatives/Materials:
Literature:
Technology/Software:
Other:

MAIN LESSON DEVELOPMENT:

- **Launch**
  - Have one group of students model clue # 1 with string. Draw and label on overhead. Equilateral shape with more than 3 sides and no parallel sides
- **Explore**
  - Form groups of 3 or 4. Have one person from each group come to front to get string (3 yards per team), Clue # 2, and Geometric Labeling Convention sheet.
    - Try making a shape that is described in the clue. If you can make it, record it and mark equal sides and parallel sides. If you can't make the shape, write "impossible" and write a justification.

- Label the shape you draw with a mathematical name. If you can't think of the name, make up a name that you think describes the shape. (See labeling convention sheet)
- Unless the clue states otherwise, your shape can have any number of sides.

- When teams complete the construction and justification of their clue, they come to front to get clue # 3.
  Clues:
  1. Shape with two sides equal and 2 different sides parallel, but not equal.
     a. Extension: can you find a shape with more than 4 sides that meet these criteria
  2. Quadrilateral with 2 pairs of parallel sides and only two sides equal

Do with geosticks.

- Each group receives a sheet of the clues. When they complete the construction and justification of their clue, they move to the next clue.
- Try making a shape that is described in the clue. If you can make it, record it and mark equal sides and parallel sides. If you can't make the shape, write "impossible" and write a justification.
- Sketch shapes. Measure angles and sides using protractor and ruler. Draw some conclusions from your measurements.
- Label the shape you draw with a mathematical name. If you can't think of the name, make up a name that you think describes the shape. (Use the sheet "Parts of words that have geometric meanings) to help name the shapes. (Page R18 in MathScape : Designing Spaces.)
- Unless the clue states otherwise, your shape can have any number of sides. A shape with at least two pairs of parallel sides that is not equilateral.
- A quadrilateral that is equilateral and has no parallel sides. (discussion point – use for informal proof/justification)
- Make up a clue of your own and write it down. Test it to see if you can make the shape, and write a sentence telling why you can or cannot make it.
- **Video Class**

1. A shape with at least two pairs of parallel sides that is not equilateral.
2. A quadrilateral that is equilateral and has no parallel sides. (discussion point – use for informal proof/justification)
3. Make up a clue of your own and write it down. Test it to see if you can make the shape, and write a sentence telling why you can or cannot make it.
   - s parallel but not equal
   -
   - Share with group
     - Make
     - Sketch
     - Label (equal sides/parallel)
     - Name
     - Impossible? Why?
4.

Summarize

Differentiation discussion (using the sticks
Think Aloud: Discussion of string/sticks in our planning?
What were the benefits of using string?
What were the benefits of using sticks?
•

MODIFICATIONS/EXTENSIONS:

- **Modifications**
- **Extensions**

- Can you find a shape with more than 4 sides that meet these criteria
- Quadrilateral with 2 pairs of parallel sides and only two sides equal

Differentiation discussion (using the sticks
Think Aloud: Discussion of string/sticks in our planning?
What were the benefits of using string?
What were the benefits of using sticks?

CHECKING FOR UNDERSTANDING (FORMATIVE ASSESSMENT)

- **What will you assess?**
- **How will you assess it?**

---------- (REFLECTION AFTER TEACHING THE LESSON) ----------

- **How did the students perform?**

- **How will you use this information to guide future instructional decisions?**

TM- **NAMING AND LABELING POLYGONS**

1. Try making a shape that fits the description in the clue.
2. If you can make the shape, record it. Then label angles and sides. If you can't make the shape, write "Impossible" and explain why.
3. Label the shape you draw with a mathematical name. If you don't know a name for the shape, make up a name that you think describes the properties of the shape.

Make a 4-sided shape with only one pair of parallel sides.

TM- **NAMING AND LABELING POLYGONS**

1. Try making a shape that fits the description in the clue.
2. If you can make the shape, record it. Then label angles and sides. If you can't make the shape, write "Impossible" and explain why.
3. Label the shape you draw with a mathematical name. If you don't know a name for the shape, make up a name that you think describes the properties of the shape.

Make a shape that is not equilateral but has at least 2 parallel sides.

TM- **NAMING AND LABELING POLYGONS**

1. Try making a shape that fits the description in the clue.
2. If you can make the shape, record it. Then label angles and sides. If you can't make the shape, write "Impossible" and explain why.
3. Label the shape you draw with a mathematical name. If you don't know a name for the shape, make up a name that you think describes the properties of the shape.

Make an equilateral shape with more than 3 sides and no parallel sides.

TM-

NAMING AND LABELING POLYGONS

1. Try making a shape that fits the description in the clue.
2. If you can make the shape, record it. Then label angles and sides. If you can't make the shape, write "Impossible" and explain why.
3. Label the shape you draw with a mathematical name. If you don't know a name for the shape, make up a name that you think describes the properties of the shape.

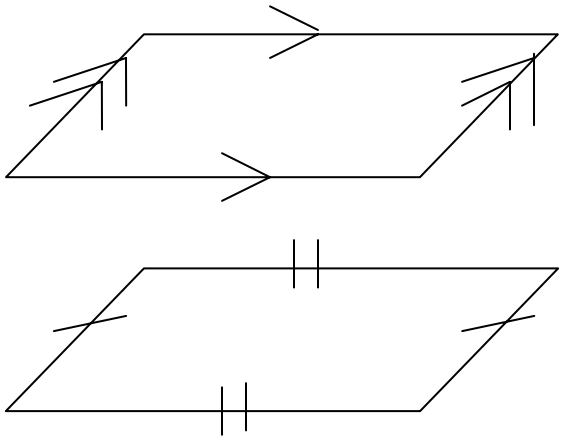
Shape Clue 1 (string) Make a 4-sided shape with only one pair of parallel sides.	**Shape Clue 2 (string)** Make a shape that is not equilateral but has at least 2 parallel sides.
Shape Clue 3 (string) Make an equilateral shape with more than 3 sides and no parallel sides.	**Shape Clue 4 (geosticks)** Make a shape with 2 sides equal and 2 different sides parallel but not equal.
Shape Clue 5 (geosticks) Make a quadrilateral that is equilateral and has no parallel sides.	**Shape Clue 6** Make up a clue of your own. Write it down. Test to see if you can make the shape. Write a sentence telling why you can or cannot make it.

"Designing Spaces." Designing Spaces – Lesson 5. *MathScape*.
TM-

Labeling Conventions

Labeling Parallel Sides and Sides of Equal Length

Here are some marks that mathematicians use to show parallel sides and sides of equal length.

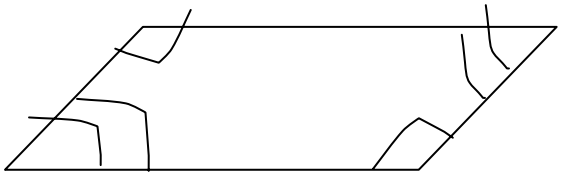


Arrows drawn on the sides indicate parallel sides. Corresponding pairs of parallel sides have matching arrow marks.

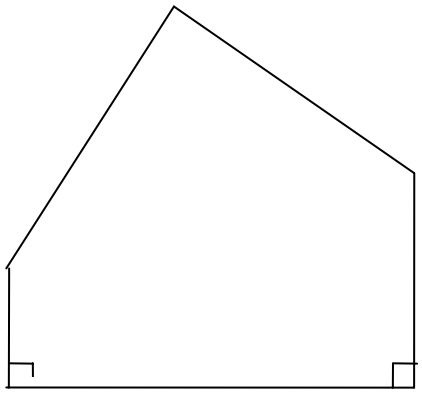
Hatch marks drawn on the sides indicate sides of equal length. Corresponding pairs of equal sides have matching hatch marks.

Labeling Equal Angles and Right Angles

Here's how mathematicians show



Arcs with a hatch mark drawn in the interior of an angle indicate equal angles. Congruent angles are indicated with an arc that has the same number of hatch marks.



A "box," or right angle drawn in the interior of an angle, indicates a right angle.

"Designing Spaces.- Lesson 5. *MathScape*.

Labeling Conventions

Continued

Geometric prefixes and suffixes

These prefixes and suffixes can help name polygons.

Word Part	Meaning	Word Part	Meaning
Tri-	3	Equi-	Equal
Quad-	4	-poly-	Many
Penta-	5	-lateral	Side
Hexa-	6	Ortho-	Right angle
Hepta-	7	-angular	Angle
Octo-/octa-	8	-gon	angle

TM-10

TEACHER OBSERVATION Processes

	Reasoning and Proof (10/4/05) (10/5/05)	Communication (10/4/05) (10/5/05)		
What are the key to know from this lesson?	Develop and evaluate mathematical arguments	Using the language of mathematics to express mathematical ideas precisely Listen for - parallel, congruent, opposite, right angles, sides, polygons		
Person A				
Person B				
Person C				
Person D				
Person E				
Person F				
Person G				
Person H				
Person I				

Activity 4: Geosketch Pad Activities

Time: 20 minutes

Overview and Rationale

Connections

This is the first activity of the day,

Conducting the Activity

- **Grouping**

- **Introduction**

.

- **Problem Solving (5 minutes)**

- **Discussion (5 minutes)**

Materials

Activities with Geosketch pad (30 minutes) (1:45 to 2:15) (Larry/Tonya)

- One we already did – Clue number 4
- Show how they can create 5 or 6 different parallelograms
  - Teacher shows how to create
  - Participants find generalizations
    - Sum = 360^0
    - Adjacent angles are supplementary
    - Opposite angles are equal
    - Diagonals bisect one another

TM Constructing Geometric Figures in Coordinate Space

Construct the figures described in the left-hand column of the chart below. Write the coordinates of the figures in the right-hand column.

Description of Figures	Coordinates of Figures
1. A square with sides of 3 units	
2. A rectangle with dimensions 2 units by 4 units	
3. A square with sides of 5 units and one vertex at (-1, -1)	
4. At least four other squares meeting the conditions in the previous description.	
5. A rectangle with a vertex at (1, 2) and dimensions 3 units b 4 units	
6. At least four other rectangles meeting the conditions in the , previous description	
7. A rectangle whose perimeter is between 12 units and 16 units	
8. Two other rectangles meeting the conditions in the previous description	
9. A square with vertices at (3, 4) and (3, 8)	
10. Two other squares meeting the conditions in the previous description	
11. A square with a perimeter between 16 units and 20 units and with a vertex at (1, 2)	
12. A right triangle with vertices at (0, 0) and (0, -6)	
13. An acute triangle with vertices at the coordinates given in the previous description	
14. A right triangle with the vertex of the right angle at (-5, -8) and having legs measuring 4 units and 2 1/2 units	

Navigating through Geometry in Grades 6 – 8

Activity 5: Van Hiele

Time: 20 minutes

Overview and Rationale

Connections

This connects Van Hiele levels discussed in all day to geometry being taught in the middle school

Conducting the Activity

- Hang up 5 pieces of chart paper. Write 0 through 4 and corresponding Van Hiele level on the top
- On big post-its, table groups write examples of ways students could respond on each level on the Van Hiele scale given one of today's lessons
  - Distributed practice drawing figures
  - Making shapes with strings
  - Making shapes with geosticks
  - Proving certain shapes were impossible

Materials

Chart paper numbered and labeled 0 to 4 with labels

Activity6. Meaningful Distribute Practice Think Aloud

Time: 20 minutes

Overview and Rationale

Connections

This is the first activity of the day,

Conducting the Activity

- **Grouping**

- **Introduction**

  .

- **Problem Solving (5 minutes)**

- **Discussion (5 minutes)**

Materials

Distributed Practice 2:30 to 3:15 (Sue/Cindy)

Think Aloud about distributed practice process

- why we chose this as distributed practice and process we went up to choose them
- Talk about first one also
- Include rest of video

TM6

MEANINGFUL DISTRIBUTED PRACTICE

Distributed Practice and Questions:

Grade Level _6__
Big Idea(s)
_____

Day One Review and Extension	Day Two Review and Extension	Day Three Review and Extension
Practice Activity 1 from TM : Side and Angle Game Cards	Practice Activity 2 from TM : Side and Angle Game Cards	▪ Because of Teacher Observation, today the teacher will pick the side and angle sides. ▪ Shape has no parallel sides and exactly two congruent angles ▪ Teacher observation for understanding of parallel and congruent
Questions: a. ? b. ?	Questions: a. ? b. ?	Questions: d. ? a. ?
Assessment:	Assessment:	Assessment:

Day Four Review and Extension	Day Five Review and Extension	Day Six Review and Extension
Practice Activity 4 from TM : Side and Angle Game Cards	Practice Activity 5 Practice Activity 4 from TM : Side and Angle Game Cards	Practice Activity 6 Shape with two sides equal and 2 different sides parallel, but not equal
Questions: a. ? b. ?	Questions: a. ? b. ?	Questions: a. ? b. ?
Assessment:	Assessment:	Assessment:

Sides and Angles Game Cards

1. Try making a shape that fits the description in the clue.
2. If you can make the shape, record it. Then label the equal angles and the right angles. If you can't make the shape, write "Impossible."
3. Label the shape you draw with a mathematical name. If you don't know a name for the shape, make up a name that you think describes the properties of the shape.

Side	**Angle**
This shape is equilateral. . . A	. . .and has exactly two congruent angles. a
Side	**Angle**
This shape has exactly two pairs of parallel sides. . . B	. . .and has two pairs of opposite angles. b
Side	**Angle**
This shape is equilateral and has at least one pair of parallel sides. . . C	. . .and has at least one pair of opposite congruent angles. c
Side	**Angle**
This shape has no parallel sides in it. . . D	. . .and has at least two right angles in it. d

"Designing Spaces." Designing Spaces – Lesson 5. *MathScape*.

TM-8

TEACHER OBSERVATION
Concept and Skills

	Meaningful Distributed Practice (Preview)Task (10/4/05) (10/5/05)	**Meaningful Distributed Practice (Review and Extension) Task (10/4/05) (10/5/05)**		
What are the key learnings we want student to know from this lesson?	Quadrilateral with only 1 set of parallel sides (Check if students understand and can draw both parallel and nonparallel.)	Cards are below (Additional Sides and Angles) I'm not sure what we want here, Cindy. Do you remember? Is it just that you will use the additional cards?		
Person A				
Person B				
Person C				
Person D				
Person E				
Person F				

TM-9

Additional Sides and Angles

Side This shape has two congruent sides... A	**Angle** ...and has exactly one pair congruent angles. a
Side This shape has three congruent sides... B	**Angle** ...and has at least one pair of congruent angles. b
Side This shape had four congruent sides... C	**Angle** ...and has no congruent angles. c
Side This shape has no parallel sides... D	**Angle** ...and has all angles congruent. d

Side This shape has exactly one pair of parallel sides... E	**Angle** ...and has at least two right angles in it. e
Side This shape has exactly two pair of parallel sides... F	**Angle** ...and has no right angles in it. f
Side This shape has opposite sides congruent... G	**Angle** ...and has exactly two pairs opposite angles. g
Side This shape has more than four sides... H	**Angle** ...and has opposite angles congruent. h

Activity 7: Debrief Geometry Readings

Time: 20 minutes

Overview and Rationale

Connections

Conducting the Activity

- Pass around key questions like high school

Materials

Activity 8: Closure

Time: 10 minutes

Overview and Rationale

Connections

Conducting the Activity

- **Closure activity**
- **Evaluation**

Materials

Assignment for November 8/9

Read intro in navigation book on visualization, spatial reasoning and modeling (pp. 59-60)

NCTM Principles and Standards – Technology (pp. 24-27)

NCTM Principles and Standards – Reread Visualization etc. (pp. 237-239)

~~Carol E. Malloy – Perimeter and Area through the van Hiele model (CD rom)~~ This is the one that was used in the all day, so we'll need to find something else. Eric had some stuff on questioning we might want to use.

We also need response sheet for readings.

Every Student Counts

Participant Feedback **Date:**

What is your primary role?

_____AEA Team _____Urban 8 District Team

What were your key learnings from this session?

What questions do you have about the information and content presented and discussed during this session?

What considerations and concerns do you have about your individual use and follow-through of the information presented and discussed this session?

What considerations and concerns do you have about your team use and follow-through of information presented and discussed this session?